THE NAUTILUS NORTH STUDY

(INCLUDING OPTIMUM WORKOUT)

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INTRODUCTION

“How much muscle can I gain in a week?” “How much muscle can I gain in two weeks? These and other such questions are commonly put to trainers and bodybuilding authorities on a daily basis. Answers to these questions, typically, have been vague, owing primarily to the fact that no studies have ever been conducted to furnish conclusive evidence.

We have long known that muscle size and strength are related and that strength increases typically indicated that one’s workouts were producing positive results that would at some point produce mass increases.

We have also known that after a workout the body must first put back the energy and resources that were used up during the workout before it can begin the process of putting back more than was used up (overcompensation).

Moreover, science has also revealed that in order to stimulate muscle growth beyond normal levels, individuals must find ways to make their muscular contractions more intense, resulting in greater tension being generated within a muscle, which the body then responds to by making the muscle bigger and stronger.

When flipping through the pages of a muscle magazine, most trainees lose sight of the fact that professional bodybuilders are the genetically blessed; i.e., they have long muscle bellies and, more particularly, many more fibers packed into a given muscle than the vast majority of us.

Consequently, when Joe Champion doubles the strength (and hence the effective cross section) of his muscles, they get much, much bigger than the average individual whose genetics are not as abundant. For instance, a bodybuilder who has four times the muscle fiber density in his biceps than another individual will, assuming both are training with sufficient intensity to double their mass, always have a muscle that is four times bigger than the average trainee’s.

With this in mind, the average bodybuilder must develop a more realistic perspective on what he might accomplish through productive training in terms of what degree of muscle mass increase he can realistically expect.

Many years ago, Arthur Jones (the now retired Chairman of the Board for both Nautilus Sports/Medical Industries and the MedX Corporation) made the statement, "If you want to learn how to train a race horse, you don't ask the race horse."

There is considerable merit in this statement as it has direct application to bodybuilders and the fact that genetics are the prime determinant of muscle size, shape and definition. This is not to suggest that these features cannot be modified or enhanced to some degree by environmental influences such as training and calorie consumption, but even then, the influence and ultimate result will fall into a small range of degrees that are likewise genetically mediated.

As soon as a bodybuilder reaches a muscular size and strength level that his genetic predisposition has deemed to be adequate for his physiology, progress slows down dramatically or ceases altogether. At this point, simply doing "more" exercise, or switching routines, or adjusting one's diet does nothing to alter this fact of biology.

At this juncture the only way one can make additional progress is by giving your body a damned good reason to grow larger muscles. Muscle growth, it must be remembered is a defensive reaction of the body to the stress of exercise. If you can perform 12 repetitions with a given resistance and you decide to terminate your set at 8 repetitions, your body has no reason to grow any bigger or stronger, because as far as it's concerned, it still has four reps in the bank -- which you never came close to utilizing.

This is why intense training, where one more repetition simply isn't possible, is an absolute requirement for inducing muscle growth stimulation. If you only did 8 reps when you were capable of 12, what "reason" would your body have to get stronger? Even if you did 2, 3 or 10 more sub-maximal effort sets, you're only going to be re-stimulating the same fibers (slow twitch at that -- those with the lowest capacity to increase in size), not involving (and thus stimulating) more fibers.

With this in mind, it stands to reason (and physiologists have proven this categorically) that the sole stimulus to increased levels of size and strength is increased intensity of effort. The greater the intensity one can generate, the greater the growth that is stimulated. However, as intensity and volume (or duration) exist in an inverse ratio to each other, it also is a matter of physiological fact that the harder or more intensely you do anything, the briefer is the amount of time you can spend doing it.

In other words, you can train hard with high intensity and brief duration or you can train easy with low intensity for long periods -- but you can't train hard for long periods.

How hard? How brief? And how long does it take for the gains that your workout stimulated to be produced? We know that subjects can grow stronger on a per workout basis, but how do these strength gains parlay into actual increases in muscle mass? And when? These were the issues we sought to answer with a recent study (June 2005) at Nautilus North Strength & Fitness Centre in Bracebridge, Ontario, Canada.

Knowing how soon a mass increase showed up gives a trainee the exact knowledge of how often he or she should train. If, for instance, a gain in mass took two weeks to be produced, then what would be the point of training more than once every two weeks? All this would succeed in doing is postponing or preempting the growth production process. If, however, the gains showed up in 24 hours, then waiting two weeks could possibly delay the gains to be had from proper bodybuilding training.

In addition, if such answers could be determined, then each individual’s optimal training frequency could be determined as soon as he or she started training, resulting in the trainee doing everything possible to maximize each trip to the gym and every workout he performed.

And as one grew stronger and moved heavier weights in one’s workouts, it would only stand to reason that the energy required to move those heavier weights would also be greater and it would take longer to replenish it (after all, lifting 100 pounds for 10 repetitions does not require as much energy as lifting 400 pounds for 10 repetitions), periodic adjustments could also be made to determine what training frequency would be required for the intermediate and advanced level bodybuilder by a similar process of experimentation in future to determine (again) their optimal training frequency.

The entire presently “gray” area of how often to train could suddenly be put into very black and white terms for each individual. This thought of breaking new ground is what served as my motivation in conducting this study.

-- John Little, Creator, *Max Contraction Training*, Author of The Nautilus North Study

CHAPTER ONE: THE BACKGROUND

When I first published the results of my latest research into the science of muscle growth in *Ironman* magazine, I would never have imagined such a tremendous response and acceptance of my material from the bodybuilding public.

And yet, many months and a new book later, I'm still answering letters and requests for more information on the method that produced “the most” muscle gains on “Nautilus North Study.” The answer, simply, was the “Max Contraction System.”

While the primary purpose of the study was to determine when – and to what degree – muscle mass is stimulated from a high intensity workout, the data (since we employed several protocols with the individuals who took part in the study) is easily analyzed and it becomes apparent quite quickly that the best gains in muscle mass were realized by Tim Peake, who happened to employ a whole-body Max Contraction routine (which I’ll outline shortly).

I knew from a prior study I had conducted with Peter Sisco that motionless or static contraction exercise would produce dramatic gains in muscle size and strength. Indeed, in just 10 weeks of Static Contraction training, trainees (who were hardcore bodybuilders who had been lifting "heavy" for a long time and averaged about 38 years of age) achieved phenomenal results:

A gain of 9.0 pounds of new muscle (one subject gained 29 pounds of muscle)
A loss of 4.9 pounds of fat
A gain of 1/2 inch on each biceps
A gain of 1.1 inches on their chest measurement
A gain of 1.2 inches on their shoulders
A loss of 0.4 inches on their waist
A 51.3% increase in their static strength

- A 27.6% increase in their one-rep max performed in their full range of motion – and this was after not having performed any full range exercise for 10 weeks
- And a 34.3% increase in ten-rep max in their full range of motion

The average time of each of these workouts was a mere 2 ½ minutes, thus proving the important of intensity, rather than duration in the muscle building process (the full details of this study can be found in the book Static Contraction Training, Contemporary Books, Chicago).

Later, Peter and I conducted another study with some seasoned golfers to see if a motionless or static workout would have a meaningful effect on their performance in golf. And, once again, the results were impressive:

Chest strength went up 58%
Back strength went up 60%
Shoulder strength went up 57%
Quadriceps strength went up 86%
Hamstring strength went up 78%
Abdominal strength went up 170%
Lower Back strength increased 58%
Calf strength increased by 51%
Triceps strength went up 133%
Biceps strength went up 72%
Forearm flexor strength went up 87%
Forearm extensor strength increased by 93%
And the overall average strength increased was a whopping 84%

And our subjects achieved all of these dramatic gains from a workout that lasted an average of 2.2 minutes and a total average of only 6.6 workouts! This parlays into a mere 14.5 minutes of exercise time, in total, performed over a period of six weeks. It struck me at this point that the potency of motionless exercise performed in a muscle’s strongest range of motion was undeniable (after all, just ask yourself if your last seven workouts have netted you an overall strength gain of 84%).

Moreover, no other training system had the hard facts to back it up, which is one of the reasons that publications such as *Muscle & Fitness, Flex, Muscle Media 2000, Martial Arts Training* and *Ironman* (among others) repeatedly hailed our training methods as “revolutionary.”

However, what I didn’t learn from our previous research was exactly when a muscle gain was produced – was it produced during week one and then sustained thereafter? Was it produced incrementally over the six or ten week period until it finally peaked? And were two workouts a week too much training?

That was why I decided to conduct the Nautilus North Study with trainees who were already of some experience in strength training, allowing me to train them hard – and then test them on a daily basis over a period of two weeks in a sophisticated body composition testing machine.

The reason for such wide welcome of all of my previous studies and, indeed, the Nautilus North Study in particular, is, I believe, due to the fact that bodybuilders have become fed up with the vague generalities and the unsubstantiated claims that have been emanating from their "champions" mouths as gospel truth and have now finally decided to seek solace in the one realm where suspect opinion cannot take root – science.

This fact delights me as indeed it would any person who concurs that our species can only progress by the systematic use of our mind and, more specifically, from our capacity to reason. Apart from being a logical, "reasonable" study, it moreover revealed the efficacy of a system of training that has the full backing of what the realm of science has to offer, and the results firmly established that the Max Contraction System also has something else going for it – it puts more muscle on more bodybuilders in less time than any other training method. The proof is in the study presented below.

SUBJECT SELECTION

At Nautilus North Strength & Fitness Centre, which is owned and operated by my wife Terri and me, along with our brother-in-law Cary Howe, we have found by personally training over 2,000 clients on a one-on-one basis, that unless an individual is grossly underweight, it is more difficult to put additional muscle on him.

Not impossible, only more difficult. More difficult in that it requires an ultra-intense effort on the part of the individual trainee. And average trainees, as a group, by and large, are not willing to invest their workouts with that much intensity, with the result that most prefer to train at a modest level of intensity, two to three times per week, and precisely because their intensity is low, they don't need longer recovery periods as their weights don't usually go up too much after their first month of training, and the stresses on the body likewise are capped.

Their progress in other words ceases and they continue going to the gym because they believe its "good" for them or because it has become a ritual of sorts in their lives. I decided to check what would happen with clients who are very motivated -- not to become professional bodybuilders, per se, but simply to become stronger and leaner for their activities of work, sports (baseball, football, golf and hockey) and day-to-day existence issues, such as being fitter, stronger individuals.

The individuals who took part in the Nautilus North Study were not grossly underweight or overweight, nor were they under-conditioned, being instead young-to-middle-aged-men, several of whom were fresh out of college where they ran and were coached in track and field. They were fit, quite muscular and already very strong, but I wanted to see when the muscular gain that they stimulated from their workouts would be produced over the course of a two-week period.

As the subjects would not be regaining previously held muscle mass (ala Casey Viator in the Colorado Experiment) and were already fairly well developed regarding their individual genetic potentials for mass and strength, any gains -- if they were genuine lean tissue (i.e., real muscle) -- would be noteworthy and of significance to those interested in building muscle.

THE PROBLEM WITH CONTROLS

As there presently exist so many methods of training (even within high-intensity circles), it is almost impossible to have a control group, as unlike giving a control group sugar pills as they do when testing drugs (placebos), there’s no way that a subject or a group of subjects will not know that they are NOT lifting weights.

For this reason, we did not have a control group for this study. The control group would be anyone who doesn’t lift weights and doesn’t get stronger. After all, it is safe to assume that if people don’t strength train (i.e., lift weights of some kind) they won’t (after puberty at least) grow stronger and bigger muscles.

PROTOCOL SELECTION

And then came the decision with regard to what protocol the subjects should perform for the purpose of this study. What routine would they perform? As our subjects were not beginners (where any type of training might produce results), we opted for advanced high intensity protocols that will be discussed shortly. The training stimulus had to be intense enough that growth would be stimulated.

And once stimulated, it should be produced. Our main focus would be on the questions of "when" the growth would be produced and "how much" of it would be produced. As each workout should produce a positive adaptation, our job was then to test when this adaptation manifested.

As training ought to be teleological; i.e., purposefully directed, we went to what science had to tell us about how to strengthen a muscle and what type of contraction was necessary to do so, and then we had a group of subjects submit to sophisticated body composition testing on a daily basis in order to determine when the gains (however great or miniscule) would show up, thus revealing the absolute soonest one could train again without disrupting the process of recovery and growth.

With respect to how many such sets are required to produce optimal size and strength increases, the *Journal of Exercise Physiology Online* recently (December 2004) published a most enlightening article in which, after an extensive review of all of the peer-reviewed scientific literature regarding training protocols concluded that one-set to failure was all that was required for building muscle size and strength in subjects with normal (i.e., non-drug enhanced) physiology. And based upon my own research cited above, I knew that one-set already had a track record of stimulating substantial gains. First, however, we needed a reliable means by which to track and assess body composition.

CHAPTER TWO: BODY COMPOSITION ANALYSIS METHODS

It is very difficult for bodybuilders and members of the general public to accurately test body composition. While it's true that there are no shortage of body composition testing methods available, it is also true that not all of them are accurate (some can be in error by upwards of 30%).

Moreover, without an accurate and repeatable means of assessing body composition, you are a rudderless ship. How do you know if your training and/or diet is producing any muscle gains at all? A bodybuilder can easily gain 10 pounds over the course of a month -- but 10 pounds of what? Water? Fat? Muscle? Fat and muscle?

A bodyweight scale can't tell the difference as it's sole function is to record bodyweight -- not determine composition. The same applies to using a tape measure (another typical bodybuilding means of assessing progress); putting 2 inches on your arm means nothing if those 2-inches are adipose tissue -- and a tape measure, like a bodyweight scale, merely measures volume -- not the composition of that volume. To make any sort of meaningful measurement relevant to determining the productivity or relative lack thereof of a given training approach, the composition of the weight and volume gained has to be accurately assessed.

You need to know, in other words, that the weight you gained from training this month was as a result of an increase in the lean composition of your body rather than fat. And conversely, if you are seeking to lose fat, you need to have a reliable means by which to know if the weight you lost was fat, water, lean tissue or a combination of all three.

A Dual Energy X-Ray Absorptiometry (DEXA) machine is good for this purpose, even being sophisticated enough to measure individual limbs for compositional components down to the gram -- however, DEXA uses radiation and, even though it is present in small amounts, who wants to be exposed to radiation in any form or magnitude for repeated sessions?

To consistently and accurately measure body composition, repeated testing is required over a short span of time – daily in our study -- in order to determine when the gains actually are produced and what the immediate effects of a proper muscle building workout are on one's muscle physiology. DEXA, while valuable for bone densitometry, which is not required to be performed so frequently, simply posed more risk than value for our purposes.

Underwater weighing (hydrostatic) is excellent and very accurate. Indeed, both Mike and Ray Mentzer utilized this method in 1980, as Mike was preparing for the Mr. Olympia contest. This method revealed that Mike was found to have gained 12 pounds of muscle over a period of only 12 days. And while hydrostatic weighing was the gold standard of body composition 20 years ago, there have been advancements in composition assessment methods since that time, most notably in the areas of practicality and convenience.

After all, who wanted to be dunked up to 10 times for 30-seconds in an underwater tank and, moreover, I wasn't interested in having my subjects drive the hour and a half to Toronto and waiting for appointments in university physiology labs to use them. Moreover, most universities aren't interested, nor do they encourage, members of the general public to use their facilities -- and certainly not as frequently as our testing required.

Bioelectric Impedance Analysis seemed promising but problems appeared with regard to both accuracy and repeatability with this technology; one client, a medical doctor in town, has a niece who is morbidly obese. He, by contrast, is a fitness freak; performing not only strength training but also competing in cross-country ski events. He is so defined that you can see quite readily virtually every muscle on his body. However, when both he and his niece tested themselves on a Bioelectrical Impedance machine, they both tested at 36%!

Evidently, many of these machines only measure the composition of the limb or limbs in contact with their apparatus; as the current so lacks strength to measure all aspects of the body. And who would want a super-charged electrical current running through their bodies, which would be required to increase the accuracy rate?

Calipers were another option, but as body fat is stored all over the body and not just in the three to four areas tested, there is no way that overall body fat can be accurately measured with such limited measurements (similarly, when body fat is lost, it comes off in a random order from all over the body and not just from the sites that the tests are conducted at).

In addition, as calipers only measure subcutaneous fat deposits, their results would tell us nothing about visceral fat (or internal fat), which is the fat that typically builds up to cause serious health problems. Moreover, of all the methods listed above, calipers have been shown to have the highest error percentage, typically the result of individuals storing fat often in different areas than those being measured at the sites the calipers target.

The only valid scientific method that I found that was ideal for the type of consistent, frequent, repeatable and reliable whole body composition testing was that offered by Body Comp Weight Analysis Centre (and I would strongly suggest to all bodybuilders who live near central or northern Ontario and are serious about testing themselves prior to a contest, in the off season, or even for performing their own testing to use this service: (705) 645 9754.

They utilize the same principle of displacement that hydrostatic weighing employs, but rather than displacing water, their machine (A "Bod Pod" capsule) measures air displacement. The testing procedure is quick (under five minutes) and accurate to a plus-minus of 2%, which puts it on a par in terms of accuracy with Hydrostatic weighing and, shy of an autopsy, is as accurate a measurement as science presently permits.

Moreover, although this technology is used in universities, hospitals and other professional institutions, this is the only one we were aware of in Canada that is open to the general public.

Utilizing this revolutionary technology, we were able to test the subjects in the study and know -- to 0.1 of a pound -- whether or not the weight the individual trainee was gaining or losing was lean or fat and whether or not a particular training and recovery protocol stimulated and allowed for the production of lean tissue -- and, even more impressively, we were able to determine exactly -- to the day -- when this gain or loss showed up.

CHAPTER THREE: THE STIMULUS

The subjects trained but once and then their body composition was tracked every day over a fourteen-day period. The workouts were engineered so as to target the major muscle masses of the body in order that the likelihood of stimulating more muscle into growth would be realized. The workout employed no more than five (low) to 11 sets (the higher sets were for two trainees who were using the original Max Contraction

Training protocol of whole body workouts consisting of isolation exercises) per workout. Each subject took their respective sets to a point of positive muscular failure, negative-only failure, static failure, or Infitonic failure.

(Note: Infitonic is a term coined by the late Mike Mentzer to describe a technique whereby a subject would perform a maximum single lift concentrically, followed immediately by a maximum negative or eccentric lift. This constituted one repetition. A 10-second rest-pause is then taken, which allows the trainee's vasculature to empty, thus delaying or preventing the build up of metabolites such as lactic acid that can compromise a maximum intensity contraction from being performed. This sequence is then repeated for a maximum of 5 repetitions).

After the stimulus or workout was applied, the subjects were instructed to do no additional resistance exercise and they simply went about their day-to-day affairs for the 14 days the study was conducted. All of the subjects were tested before the stimulus was applied.

As we were checking solely for lean (muscle) tissue increases, we did not instruct the subjects to reduce calories or to increase their caloric intake.

We wanted the sole variable to be the training stimulus. As a reduction in calories could compromise the lean content of the body (as if calories are restricted too low, lean tissue is often sacrificed to make up the differential), we knew that if the subjects ate their usual calorie intake (which they did) they would not sacrifice muscle tissue.

This wasn’t a “weight gain” study which typically sees the subjects eating more and gaining predominantly fat tissue; this was a study the sole focus of which was to determine how much muscle could be produced and when it would show up.

CHAPTER FOUR: THE RESULTS

THE RESULTS OF 2-WEEK STUDY

Name	Start Lean	Finish Lean	Day of Peak Lean	Day of Lowest Lean
C. Greenfield	165.9	166.6	Day 10 (169.8)	Day 5 (160.7)
D. Craig	120.9	121.6	Day 5 (123.7)	Day 10 (118.6)
D. Beaudry	138.2	138.7	Day 1 (143.1)	Day 9 (137.8)
C. Bell	140.6	142.3	Day 6 (143)	No low read
J. Biggs	171.9	171.5	Day 1 (173.8)	Day 4 (169)
I. Heshka	173.1	172.2	Day 7 (175.2)	Day 8 (170)
C. Howe	137.9	138.9	Day 10 (139.4)	Day 7 (135.6)
J. Little	144.5	146	Day 11 (146.7)	Day 1 (142.8)
J. Ostertag	120.9	120.1	Day 5 (122.6)	Day 1 (120.1)
T. Peake	138.4	143.2	Day 6 (147.7)	Day 9 (137.7)

J. Williams	142.4	144.1	Day 9 (145.7)	Day 3 (140.9)

LEAN GAINS IN TWO-WEEKS (in pounds) OVER STARTING LEVEL OF LEAN

Name	Start Lean	Finish Lean	Day of Peak Lean	Day of Lowest Lean
C. Greenfield	165.9	166.6 (.7)	Day 10 (3.9)	Day 5 (-5.2)
D. Craig	120.9	121.6 (.7)	Day 5 (2.1)	Day 10 (-2.3)
D. Beaudry	138.2	138.7 (.5)	Day 1 (4.9)	Day 9 (-.4)
C. Bell	140.6	142.3 (1.7)	Day 6 (2.4)	No low read
J. Biggs	171.9	171.5 (-.4)	Day 1 (1.9)	Day 4 (-2.9)
I. Heshka	173.1	172.2 (-.9)	Day 7 (2.1)	Day 8 (-3.1)
C. Howe	137.9	138.9 (1)	Day 10 (1.5)	Day 7 (-2.3)
J. Little	144.5	146 (1.5)	Day 11 (2.2)	Day 1 (-1.7)
J. Ostertag	120.9	120.1 (-.8)	Day 5 (1.7)	Day 1 (-.8)
T. Peake	138.4	143.2 (4.8)	Day 6 (9.3)	Day 9 (-.8)
J. Williams	142.4	144.1 (1.7)	Day 9 (3.3)	Day 3 (-2.5)

The above numbers indicate not body weight, but lean weight. The actual weight of the subjects – as measured by a scale – was considerably higher than indicated above, but as we were only interested in lean (or muscular) bodyweight, that is the only reading we have presented.

The most striking gain was recorded by T. Peake (more to follow), who peaked at 9.3 pounds after six and a half days of recovery and was up 4.8 pounds after two full weeks of body composition testing (all of this from only one workout). Such a rate of increase, if continued at this pace for a full year (which seems very unlikely) would see him gain 9.6 pounds of muscle per month, or 115.2 pounds of muscle per year.

As this would be an unprecedented rate of increase, it is more likely that his rate of gain would arrest at some point, although we can't know in advance precisely when or what this point would be. Moreover, given that muscle will continue to respond with increases in size and strength providing it receives both the stimulus for change and the time required to produce such change, one must grant that such a gain, while heretofore unprecedented, is nevertheless possible statistically.

More likely, we should look to the average gain experienced by all subjects as something more realistic and therefore attainable. In determining the averages, we have presented the actual gains/averages from all of the subjects in the study, followed by the actual gains/averages with the highs and lows factored out in order to determine a more likely average for those of average genetics and recovery ability.

Averages Including all Study Participants During 2-Week Period

Beginning Lean Mass: 144.97
Ending Lean Mass: 145.93

Gain in Lean Mass: .955
Peak Lean Mass: 148.23
Gain in Lean at Peak: 3.27
Day of Peak Gain: 6.5
Lowest Lean before Peak: 143.77
Pre Peak Loss of Lean: 1.20
Day of Pre Peak Loss: 1.9
Overall Lowest Lean: 143.07
Overall Loss of Lean: 1.90
Day of Overall Lowest Lean: 5.18

Averages of middle 9 values (dropping high and low in each category)

Beginning Lean Mass: 144.52
Ending Lean Mass: 145.88
Gain in Lean Mass: .733
Peak Lean Mass: 148.10
Gain in Lean at Peak: 2.80
Day of Peak Gain: 6.6
Lowest Lean before Peak: 143.17
Pre Peak Loss of Lean: 0.8
Day of Pre Peak Loss: 1.5
Overall Lowest Lean: 142.80
Overall Loss of Lean: 1.74
Day of Overall Lowest Lean: 5.22

CHAPTER FIVE: A NEW OBSERVATION: MUSCULAR SUPRESSION

You will note that a pattern to muscle growth is evident from the data: the lean composition of human muscle actually dipped or was suppressed after the stimulus/workout was applied, reaching a low at Day 5 (on average) and not coming up for several days afterwards.

Evidently, muscle tissue is like a sponge; immediately after an intense workout it is, for wont of a better term, compressed; its constituents, some of which we know such as glycogen, are used up and not immediately replaced, with the result that the lean composition of the body can actually be reduced or go down by several pounds and stay this way for several days after a workout.

But then, over time, the lean tissue fills back up again and, if the workout had been sufficiently intense enough to stimulate a compensatory build up of new tissue, it will grow back bigger than it was prior to the previous workout.

In other words, the muscle growth process is not an entirely linear progression; the muscle content of the body first gets smaller, then proceeds to increase in its volume with periodic ebbs and flows throughout the process until it finally returns (recovers) to its pre-workout size and then gets a little big bigger (overcompensates).

CHAPTER SIX: NO DECOMPSENATION IN 48 TO 96 HOURS

Whereas individuals have indicated that decompensation (or loss of muscle tissue from disuse) occurs after 48 or 96 hours, our study revealed no evidence of this. In fact, it often took in excess of 7 days or 178 hours for the gains to be produced.

Knowing this, and the fact that the muscles must first recover before they can grow, we can infer that training before peak growth has taken place will only keep the muscle tissue suppressed and postpone the maximum production of new muscle.

The average peak gain from the workout arrived almost a full 7 days later, and a large portion of the peak gain held by the body right up until testing ended on day 14.

CHAPTER SEVEN: PREDICTIONS

With the data from the foregoing chapters, we can now make some predictions of rate of muscle gain based upon a continued growth pattern and the trainee hitting his targeted peak training day and also predictions of the rate of growth by those who train but once every two weeks. The predictions are indicated below:

PREDICTIONS

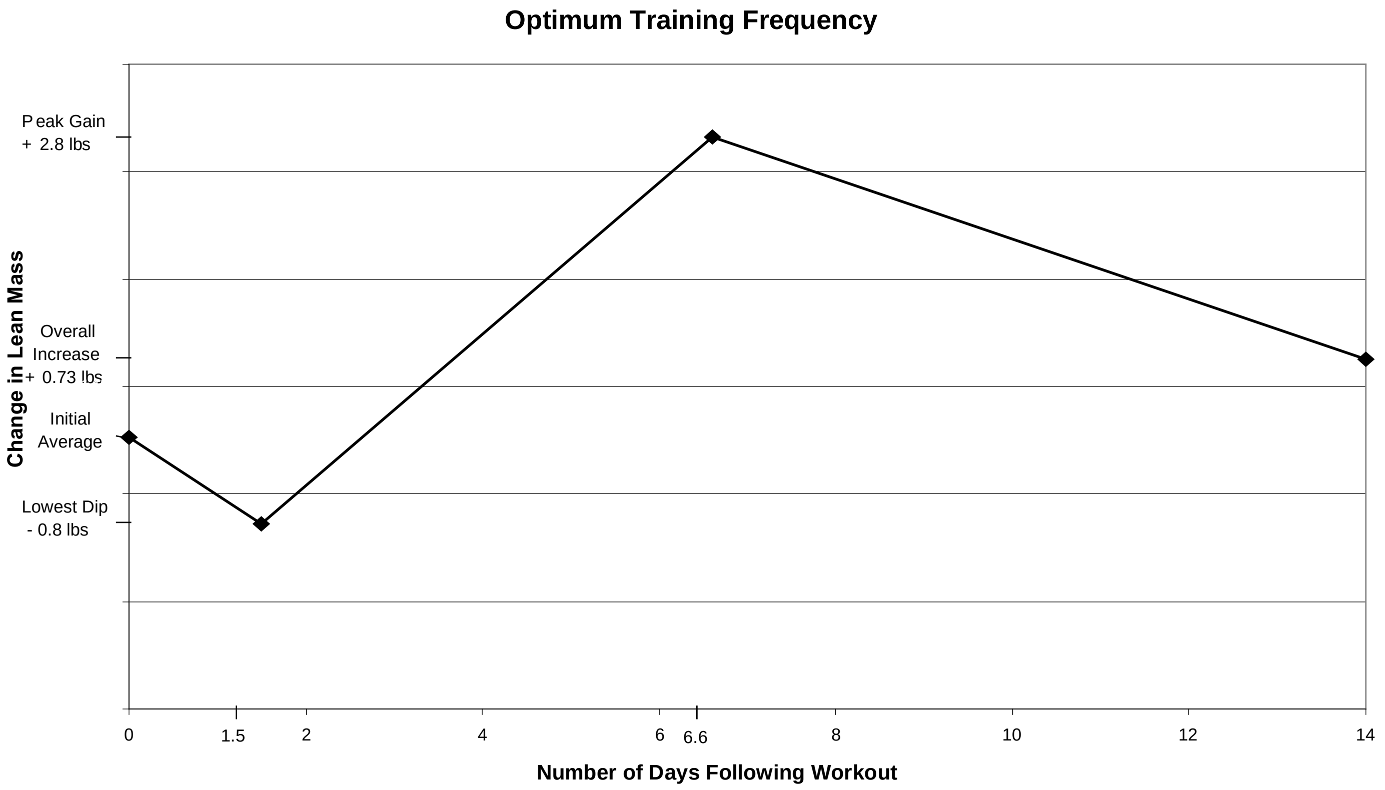
6.6 Day Period		14 Day Training	
Base Value	2.800	Base Value	0.733
1 week	2.970	1 week	0.367
2 weeks	5.939	2 weeks	0.733
4 weeks	11.879	4 weeks	1.466
2 months (8 weeks)	23.758	2 months (8 weeks)	2.932
6 months (26 weeks)	77.212	6 months (26 weeks)	9.529
12 months (1 year)	154.424	12 months (1 year)	19.058

INTO THE FUTURE

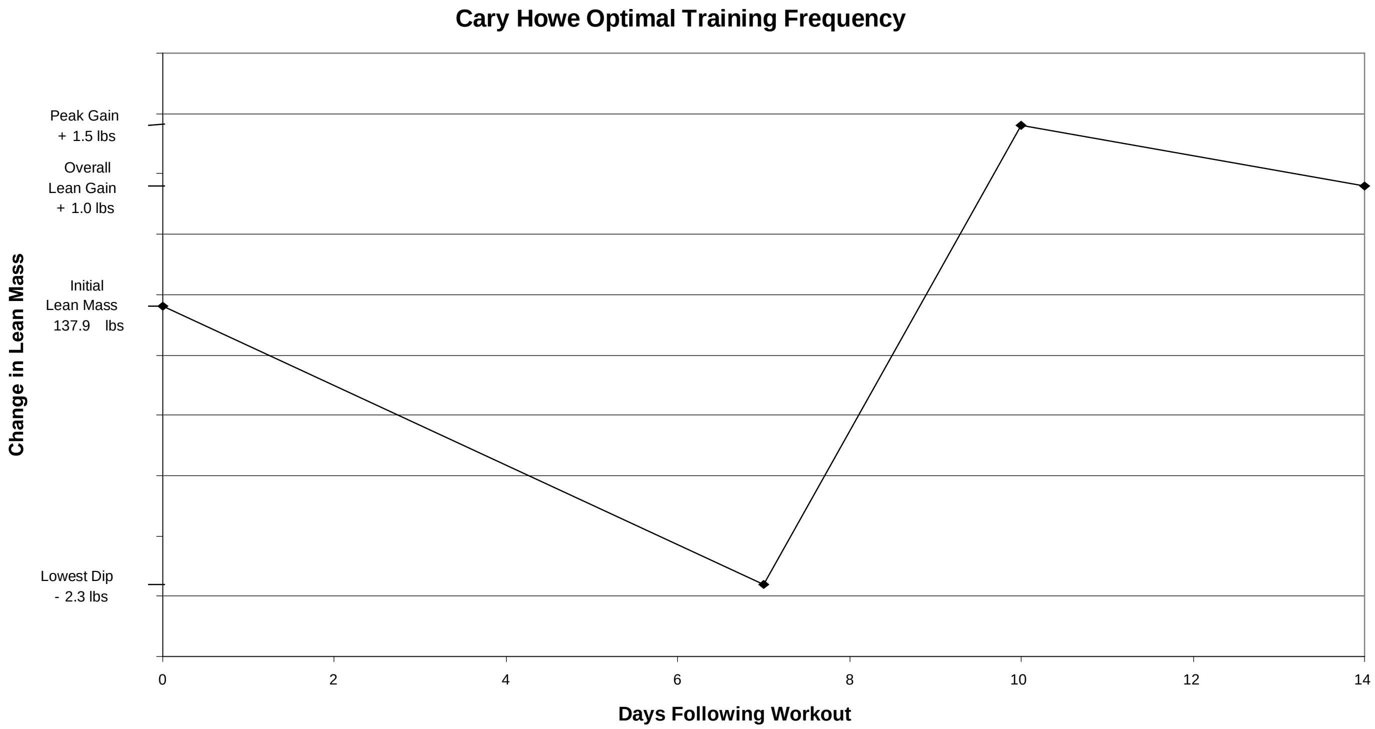
Based on the data from this study, the average peak day was 6.5. If we drop the highs and the lows to get a better average, we see that the average extends out to 6.6 days. The average muscular suppression or dip day occurs at day 1.9 and continues for several days thereafter.

The average gain worked out to be .733 or just under threequarters of a pound of muscle per two-week period and 5.93 pounds in two weeks (based upon the peak growth point). Such gains are considerable (some, such as the projection of 154 pounds in a year, undoubtedly beyond considerable), as it will see the average trainee (with those of above average genetics gaining more and those of below average genetics gaining less) gaining at least 19 and-a-half pounds of solid muscle per year.

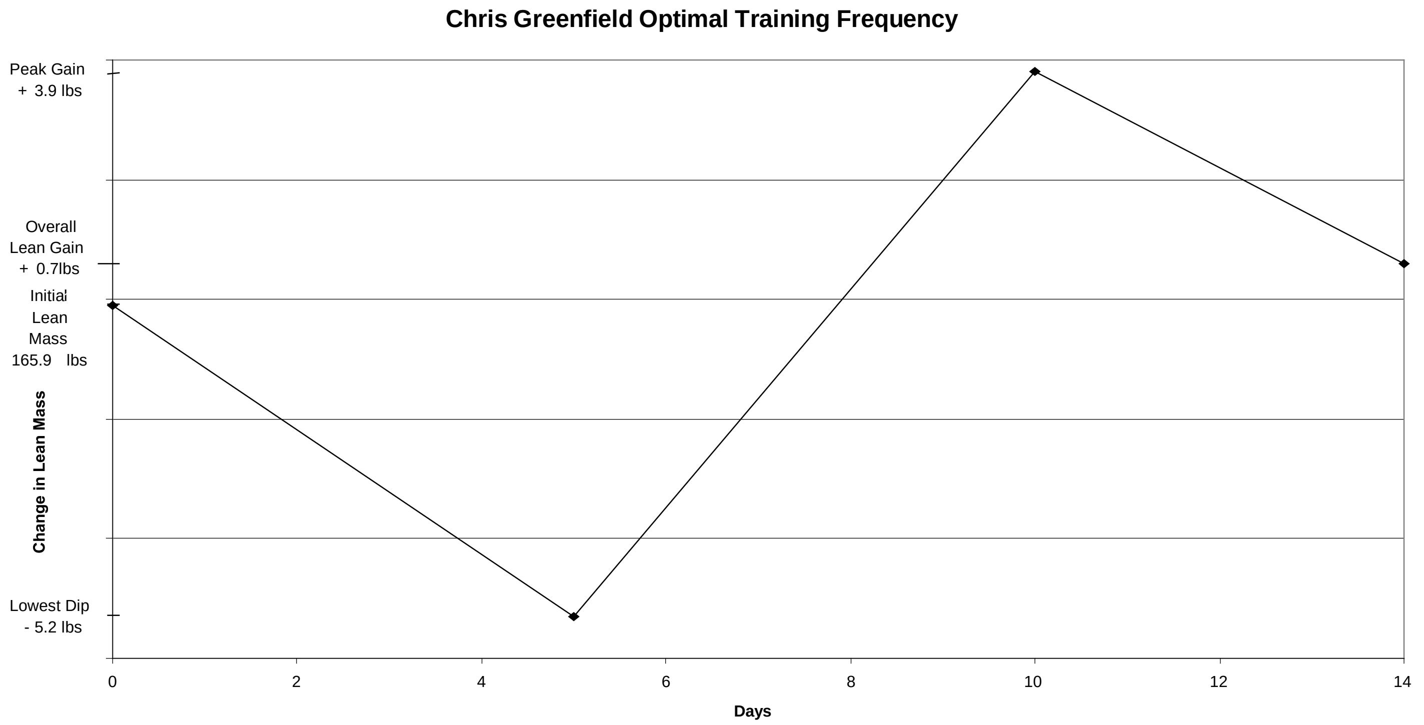
Moreover, this gain is achieved not by training every day, not by taking expensive supplements or drugs, not by drinking gallons of milk, but by eating normally and training but once every two weeks. If you didn’t gain 19 and a half pounds of muscle this past year, then paying attention to the “compression” or dip of lean tissue prior to the growth being produced is particularly noteworthy as it is a phenomenon that was observed in *all* trainees and is, we suspect, applicable to the vast majority of trainees. Ignoring what would appear to be a biological law such as this could explain why many bodybuilders fail to make the progress that they are capable of.



Trend showing the dip (muscular suppression) and peak and tapering pattern of muscle growth after being stimulated. Note that for the average person, the peak gain does not show up until almost 7-days after the stimulus (workout) has been applied. Training before this is produced would actually serve to post-pone or prevent the muscle from growing bigger.



Subject Cary Howe’s Optimal Training Frequency occurs at Day 10. If he were to train on Day 6 (the average peak gain day for those on the study) he would actually be down, owing to muscular suppression, by 2.3 pounds. His optimal training frequency is once every 10 days. If he waited until Day 14 he would lose one-third (or half a pound) of the lean tissue he stimulated.



Subject Chris Greenfield’s optimal training frequency is also longer than the “average,” requiring 10 days to elapse between workouts for peak adaptation to take place. Although he is tracking upwards by Day 6 (after five days of muscular suppression), his lean is well below his starting or pre-workout level. It is only on Day 8 that his lean is back to his pre-workout level, and Day 10 before it hits its peak. If he waits until Day 14 he will still be stronger and leaner (by 3/4s of a pound) than he was prior to his previous workout, but well below what his peak level was on Day 10.

CHAPTER EIGHT: INTERPRETING THE DATA

Such gains – between 0.733 and 2.97 pounds (depending upon average and peak gains) per week -- of real muscle – produced in two weeks are very significant.

Simple addition will reveal that if this rate of progress can be sustained, an individual would end up gaining between 19 ½ pounds and 154.42 pounds of muscle in one year, both of which represent not only phenomenal rates of increase (particularly given that we are talking about "new" muscle being gained) but, in all likelihood, would likely see a given individual reach his full muscular potential -- whatever it may be -- in one year or less.

We’re not suggesting that such has been done – merely reporting that the preliminary data based upon the results of the above average subjects over the course of two weeks at least offers the suggestion that such is possible. Is it likely that someone could gain 100 to 154 pounds of muscle in a year?

Perhaps not, but then again we can't say "yes" or "no" with any certainty at this juncture, simply because no one has accomplished this yet. At the very least, however, this new data suggests that such is at least possible mathematically and to some degree biologically.

The evidence would suggest that such a gain would require a willingness to generate tremendous intensity in one's workouts, and particular, strict attention to the recovery periods in between workouts (which is when the growth is actually produced.) Moreover, we would suspect that such gains, if and when they are forthcoming will be almost solely dependent upon a given individual's genetic potential, which is something we cannot predict with infallible certainty in advance of the realization of such potential.

If an individual reading this believes that he has better genetics than those of the subjects we trained in this study, it only stands to reason that the same protocol and frequency will produce even more impressive gains. After all, if a subject has more muscle fiber density; i.e., more muscle fibers per square inch of muscle, the more of those fibers will be stimulated to grow bigger and stronger. And as a less intense training approach or a training approach that is too long, thus using up too much of an individual trainee's recovery ability is coupled with insufficient recovery time, even a subject with superior genetics will be unable to realize his or her full muscular potential.

We can predict, then, that this type of muscle gain -- shy of drug implementation - is downright impossible for those who do not train with greater levels of intensity. After all, as I mentioned earlier, muscle growth, particularly new muscle growth is a defensive reaction of the body to the stress of exercise and must literally be forced.

And as Mike Mentzer once asked: "How do you force growth with mild exertion, light weights, easy workouts?" And the answer is: You can't. It takes incredibly hard training to build bigger muscles and sad truth is that few of us are willing to train that hard, or to allow our bodies the time they require to produce such growth, preferring to train more along the lines of what others are doing and settling for miniscule progress for a while and then assuming that no more growth is possible or that drugs are the only solution to breaking out of their training rut.

I can tell you that Body Comp has tested hundreds of clients using all sorts of training programs over the past eight or nine months and invariably those who trained the most gained the least. The clients who are making the best progress are training very intensely and very infrequently.

For now, this information should whet your appetite to train a little more intensely and to allow more recovery time to elapse between your workouts. After all, the growth you have stimulated in the gym is only produced when you are at rest; i.e., out of the gym, which, as we learned, takes in most instances from seven to 14 days (or longer).

CHAPTER NINE: THE MOST SUCCESSFUL SUBJECT

As touched on earlier, the subject who gained the most rapidly on the two-week study was Bracebridge, Ontario resident, Tim Peake. Peake’s rate of progress, isolated from the rest of the group was far above average. Perhaps this was a result of his genetic predisposition to build muscle mass, or the fact that he trained on the Max Contraction protocol while the others did not. Most likely, it was a combination of both.

TIM PEAKE’S RESULTS AFTER ONE MAX CONTRACTION WORKOUT

Name	Start Lean	Finish Lean	Day of Peak Lean	Day of Lowest Lean
T. Peake	138.4	143.2	Day 6 (147.7)	Day 9 (137.7)

LEAN GAINS IN TWO-WEEKS (in pounds) OVER STARTING LEVEL OF LEAN

Name	Start Lean	Finish Lean	Day of Peak Lean	Day of Lowest Lean
T. Peake	138.4	143.2 (+ 4.8)	Day 6 (+9.3)	Day 9 (-.8)

At the start of the study, Tim weighed 193.2 pounds. At the end of the study he weighed 192.7 pounds. If one were to go solely by the gains on a bodyweight scale, one might be tempted to conclude that Tim’s Max Contraction workout produced a half pound loss.

However, since we utilized an ultra-high-tech body composition testing machine (air displacement plethysmograph), we found out what spectacular results that one workout produced! While Tim’s bodyweight actually did go down a pound, his muscle weight went up by 9.3 pounds and his bodyfat reduced by 9.8 pounds, resulting in a dramatic and very positive change in his muscular appearance.

In addition, this peak in muscle gain occurred on day 6 of the study – i.e., 6 days after his workout and during which time he did NOTHING at all, which is exactly what was required for his body to produce the new muscle growth – after first being stimulated into producing more growth by the Max Contraction Training system. While we will outline the exact workout, exercises and weights that Tim employed to stimulate such dramatic gains in muscle mass shortly, it will benefit the reader to first learn something about the protocol that Tim employed so that the workout, when it is finally presented, will be done within a more meaningful context.

CHAPTER TEN: MAX CONTRACTION TRAINING

The "Max Contraction System" is a system of training that is based upon the premise that the heavier the weight a muscle can be made to contract against, the more muscle fibers will be recruited to produce the force necessary to move or contract against it, and that the strongest position in a muscle's range of movement is the position of full or maximum contraction.

Indeed, the longer one can keep a muscle in a maximum or fully contracted position of a given movement against a maximal resistance, the more muscle fibers will be activated and, hence, the more muscle growth stimulated.

This is not a random hold, as with protocols such as isometrics or static contraction, where the hold point can be anywhere in a muscle's range of motion, but rather a maximal effort to hold the resistance in a given muscle's position of full muscular contraction. This position is then maintained for a minimum of 1 second and a maximum of 60.

Why this time frame? The time frame is such in order for the exercise to utilize exclusively the anaerobic pathways and not, as in high set and rep routines, the aerobic pathways -- which work wonders for improving one's endurance or capacity to prolong training, but precious little in the way of improving one's muscle mass.

To stimulate maximum increases in strength and muscle mass on literally a "per workout basis" you'll have to take each and every set you do for a given body part to the point where 100% of your momentary ability has been utilized.

Intensity, as Mike Mentzer properly defined it, is the percentage of possible momentary effort that one is capable of generating – with low intensity activities such as walking, light weight training and golf representing the lower end of the spectrum and Max Contraction and other high intensity training protocols such as Power Factor, Static Contraction and Heavy Duty representing the other end.

At the low end of this spectrum is the minimal percentage of possible momentary effort, while at the high end is the maximal percentage of possible momentary effort. Endeavoring to make the intensity of your exercises higher and higher is, quite simply, the most important factor in increasing your size and strength.

Training to what has been labeled "the point of failure," where another second of a maximal contraction cannot be sustained despite your greatest effort will insure that you've passed the "threshold of intensity;" i.e., the point in a set below which growth is not stimulated and above which it is.

It is essential when embarking on a system such as Max Contraction to understand the basic physiological principles of exercise that are elucidated in my book, *Max Contraction Training: The Scientifically Proven Method for Building Muscle Mass in Minimum Time*, particularly principles such as the "all or none" principle of muscle fiber contraction.

"ALL OR NONE"

In reading from page 53 of the textbook "*The Physiology Of Exercise*," by Herbert A. DeVries from the University of Southern California, we see that "If a muscle fiber (or motor unit) is stimulated by a single impulse at or above threshold value, it responds by a contraction, or twitch, that is maximal for any given set of conditions of nutrition, temperature, etc.

In other words, stimulation by impulses much larger than threshold value will result in no increase in either the shortening or the force of contraction. The muscle fiber contracts maximally, or it does not contract at all, and this fact is referred to as the *all-or-none law* of muscle contraction."

Professor DeVries goes on to mention that “this law applies to the motor unit, since all its component fibers are innervated by the same nerve fiber and impulse – it does not, of course, apply to whole muscles.” This principle or physiologic “law” refers to the fact that when a given muscle fiber is stimulated to contract, it will contract maximally while the rest of its fibers do not contract at all -- this as opposed to an entire muscle’s fibers contracting all at once but to a lesser degree.

With this in mind, it stands to reason that the surest way to involve more muscle fibers in a given contraction is to take the muscle you're training into the one position where the maximum number of muscle fibers that are capable of being activated are, in fact, called into play.

In a normal set, wherein one starts a given movement against, literally, "zero" resistance, then moves into a position of mild resistance, then moves into a position of greater resistance and, finally, moves into a position of maximum resistance, it is only this final position -- the fully contracted position -- that yields the most benefit in terms of stimulating the most fibers. And ironically, this position is seldom – if ever – emphasized in conventional training methods and protocols.

A perfect example of this is in the leg extension exercise. Looked at physiologically, this exercise will see the trainee initiate the movement using only the barest amount of muscle fibers required to do the job. At the halfway point, a few more muscle fibers will have been called into play and then, at the position of full muscular contraction or where the legs are fully extended, as many fibers as can possibly be recruited will be activated to hold the resistance in this fully contracted position.

However, long before the fibers have been stressed maximally, the resistance is typically lowered (often dropped), giving the momentarily stressed quadriceps muscles a chance to disengage (and recover to a certain extent), which is the very opposite effect of what you should be trying to accomplish.

This means, in effect, that in a given 10 rep set performed at a typical cadence of taking 2-seconds to raise, 1-seconds to hold, and 3-seconds to lower -- which lasts about sixty seconds -- maximum muscular involvement takes place for a total of only 10 seconds. So out of a possible 60 seconds worth of maximum muscle stimulation, the trainee is obtaining only one tenth of the results he is capable of deriving from the movement. Viewed in this light, it becomes painfully obvious that the trainee is wasting the other nine\tenths of the time he’s been employing on the exercise.

Conversely, when a given muscle group is brought into a fully contracted position and made to contract maximally against a heavy resistance for a full 60 seconds, the maximum amount of muscle fibers that can be activated to assist in the task will be called into play and thoroughly stimulated until they are incapable of supporting the full contraction. As soon as the trainee can no longer hold the contraction, he will have effectively exhausted all of the muscle fibers involved in that contraction, which just so happens to be all of them.

And the 60-second time frame is purely for purposes of illustrating the difference in efficiency between conventional or full-range training protocols and Max Contraction – or one-tenth efficiency versus ten-tenths or 100 percent efficiency. In truth, research has indicated that only one to six seconds of maximal intensity stimulation is necessary – if the muscle is in the fully contracted position; training closer to one minute requires activating the body’s aerobic system to some degree, thus compromising the pure anaerobic element – which is the element most responsible for size and strength gains.

When the system was first tested in the late 1980s, the standard time frame I implemented was 45 to 60 seconds, which is the same time frame that Tim Peake employed -- and very good gains were reported. I personally supervised the training of one subject in 1986 who trained but three days a week on a Max Contraction program of one 45-60 second set of 11 different exercises.

This averaged out to a total time frame of between 8 minutes and 55 seconds and 11 minutes per whole body workout or a total of between 25.5 and 33 total minutes of training time per week. At the end of five weeks, the subject had improved a minimum of 100% over his starting level of strength in all exercises and, more importantly for our purposes, his lean body mass increase was a total of 16 pounds – and this was an experienced bodybuilder.

When you try and remember the last time that you gained 16 pounds of pure muscle tissue over a five-week period, you'll begin to appreciate just how effective the Max Contraction System is!

Nevertheless, there was room for refinement; in the early 1990s, I experimented with increasing the resistance, which necessitated a decrease in the time of contraction (or TOC) to 15 to 30 seconds per set -- and the strength of all trainees using the revised protocol increased markedly.

Finally, in 2001, after reviewing a series of physiology studies conducted over 50 years ago – particularly the studies of Doctors Muller and Hettinger, which indicated that a one-to-six second maximal contraction could produce strength gains equal to or better than protocols involving more sets and longer hold times – I decided to revise the protocol again once more increasing the intensity of the contraction by increasing the resistance and reducing the time of contraction to a mere 1 to 6 seconds.

Doing so meant that the actual volume or length of the workout was reduced commensurately to only 10 to 60 seconds of actual workout time. Once again, the strength and size gains of those who tried the new protocol increased – and dramatically!

One subject increased his shrug weight by over 400 pounds in a little less than one month of whole body workouts performed once weekly and lasting, on average, 40 seconds each. However, I have also found that the 30 to 60-second time frame is necessary for people who are new to Max Contraction Training as it better trains the neuromuscular pathways of the trainee, thus getting him more efficient at recruiting muscle fibers but also with what the onset of genuine contractile “failure” is.

It is too easy to quite a set owing to the pain associated with lactic acid build up and genuine discomfort and starting out too heavy with too short a TOC (Time of Contraction) will see the trainee quit prematurely owing to these factors rather than as a result of genuine muscular failure, thus compromising his results.

By gradually reducing the TOC over a period of time, the trainee is more accustomed to the protocol, his neuromuscular efficiency is enhanced and he is more likely to terminate a set owing to legitimately being unable to sustain a maximal muscular contraction.

My recommendation would be to spend the first five months at 30-60-seconds of TOC, the next three to four months at a 15-30-second TOC, and, finally, thereafter attempting to reach muscular failure with a TOC of between 1-and-6-seconds.

The reason why virtually all subjects who have used this protocol experience such dramatic muscular results while using the Max Contraction System is this; any exercise performed the conventional way (i.e., utilizing repetitions) involves movement either towards or out of a position of maximum contraction. As maximum muscular contraction is our objective, anything less than a maximum contraction is less efficient in stimulating growth.

Whether the movement is performed either eccentrically or concentrically, the very fact that it moves at all means that it will have fluctuating levels of fiber involvement and, hence, fiber stimulation. Remember, that the closer a movement is to the fully contracted position, that is, a movement in which maximal resistance is truly in a position of full muscular contraction, the more muscle fibers are involved and activated by the stressor.

And, as we’ve seen, in Max or fully contracted exercise, all available muscle fibers are under a constant stress or "intensity" of the highest order from the moment the contraction is initiated until it's completion.

CHAPTER ELEVEN: THE MOST PRODUCTIVE WORKOUT

In order to derive the most benefit from M.C.S. training, it is vitally important to select exercises that allow you to achieve a full muscular contraction. Many conventional and popular bodybuilding exercises do not incorporate the proper physics to provide maximum resistance in the fully contracted position. I'm thinking here of movements such as squats, barbell curls (where the resistance falls off once you pass through the half way point of the movement) and most types of pressing movements.

It is this lack of direct resistance in the fully contracted position that makes these exercises inefficient in an Max Contraction System training program Exercises must be selected for M.C.S. training that enable the targeted muscle group to be contracted completely, against maximum resistance for a 1-6 second time period. The following list of exercises have been found to be the best for this purpose:

TIM PEAKE WORKOUT

EXERCISE	WEIGHT	TOC
1.) Hip & Back	170	49
2.) Leg Extension	220	40
3.) Leg Curl	90	36
4.) Multi Exercise (Calf Raise)	180	42
5.) Super Pullover (Lats)	190	45
6.) Lower Back	260	37
7.) 10-degree chest	160	36
8.) Lateral Raise	170	45
9.) Kickbacks on Nautilus Super Pullover	70	46
10.) Multi Biceps	140	41
11.) Nautilus Ab	180	35

HOW TO PERFORM THE EXERCISES

Hip and Back: While lying on the back, position the body so that the hips are aligned with the axes of the cam. Extend both legs and push back with the arms until the legs, with the feet together, are locked at the knees and below parallel to the floor so as to arch the back. Either push out or have a training partner push the resistance arms down until both legs are joined at extension. Arch the back and contract the buttocks. Sustain this contraction for 30-60 seconds.

Leg Extension: Assume a properly aligned position in the machine. Extend both legs smoothly as far as possible (you may require a training partner to help you lift the resistance into the fully contracted position). Sustain this contraction for 30-60 seconds.

Leg Curl: Lie face down on the machine with the heels placed under the rollers. The knees should be just off the bench. Lightly grasp handles. Curl legs (or have your training partner assist in raising the movement arm for you) trying to touch heels to buttocks. Lift buttocks at the top of the movement to increase the muscle contraction. Pause in this fully contracted position for 30-60 seconds.

Multi-Exercise (Calf Raise): Affix the weight belt around your waist and stand up straight. Place your hands on the cross carriage in front of you and step onto the first step of the Multi Exercise machine. Raise yourself up, using only the strength of your calf muscles) onto your tiptoes until your calves are fully contracted. Sustain this contraction for 30-60 seconds.

Super Pullover: Adjust seat so that the shoulder rotates on a common axis with the cam. Assume upright position and fasten seat belt tightly. Press foot pedal until elbow pads are about chin level (you may require a training partner's assistance) and place elbows on pads. Hands should be open and resting on the curved portion of bar. Remove legs from pedal and slowly rotate elbows down until they level with the lower portion of your chest. Sustain this contraction for 30-60-seconds.

Lower Back: Enter the lower back machine by straddling the seat bottom. Sit forward in seat. Make sure that your back is underneath the highest roller pad. Stabilize your lower body by moving your thighs under the roller pads. Adjust the pads until your thighs are secure. Place feet firmly on platform or step and fasten the seat belt. Interlace your fingers across your waist and move your torso backward smoothly and slowly until it is in line with thighs. Sustain this fully contracted position for 30-60-seconds.

10-Degree Chest Machine: Lie on your back with your head higher than your hips. Place your arms under the roller pads. The pads should be in the crooks of your elbows. Move both arms (with the help of a training partner if necessary) in a rotary fashion until the roller pads touch over your chest. Sustain this fully contracted position for 30-60-seconds.

Double Shoulder (lateral raise): Adjust the seat so that the shoulder joints are in line with axes of the cam. Fasten seat belt and pull hands back until knuckles touch pads. Lead with elbows and raise both arms (again, with the assistance of a training partner if necessary) until parallel with floor. Sustain this full contraction for between 30-and-60-seconds. Pause, slowly lower and repeat. After final repetition, immediately begin seated press.

Kickbacks on Nautilus Super Pullover Machine: Sit down in the Super Pullover machine and adjust the seat so that the shoulder rotates on a common axis with the cam. Assume an upright position and fasten the seat belt tightly. Press foot pedal until elbow pads are about chin level (you may require a training partner's assistance) and place elbows on pads. Your hands should be hanging down at your sides and not resting on the bar. Remove legs from pedal and draw your elbows back so that your lower arms are behind the body at either side of your torso. Sustain this contraction for 30-60-seconds.

Biceps Curl: In a seated position, place elbows on pad aligned with center of cams. Adjust seat so that shoulders are lower than elbows. Curl both arms until wrists are just in front of neck. Sustain this fully contracted position for between 30-and-60-seconds.

Abdominal Machine (Next Generation): Assume a properly aligned position. Spread knees and sit erect. Grasp handles over shoulders. Keep shoulders and head firmly against seat back. Shorten the distance between your ribcage and navel by contracting your abdominal muscles only. If necessary, have a training partner assist you into the position of full contraction of the abdominals. Do not pull with latissimus or triceps muscles. Keep legs relaxed. Sustain this fully contracted position for between 30 and 60-seconds.

PURPOSE AND BENEFITS OF THIS PROGRAM

Nautilus Machine	Muscles Developed	Action of Muscles	Fitness Basis for Exercise
1.) Hip and Back	Buttocks, lower back	Extend the spine, lateral flexion of the spine, extend upper leg	Eliminates lower back-related problems
2.) Leg extension	Quadriceps	Extend lower leg	Eliminates frontal thigh pulls
3.) Leg Curl	Hamstrings	Extend and flex upper leg, flex lower leg	Eliminates rear thigh pulls
4.) Calf Raise	Calves	Raise the heel	Assists in protecting the joints of the ankle and knee
5.) Pullover	Latissimus dorsi (side-back)	Move arm down and backward, stabilize torso	Eliminates lat pulls, stabilizes shoulder
6.) Lower Back	Spinal erector muscles	Draws trunk to an upright position	Prevents lower back strain, stabilizes spine
7.) 10-degree chest	Chest	Draws arm across torso	Eliminates chest pulls, stabilizes shoulder
8.) Multi Biceps	Biceps	Flex the arm	Assists in holding arm comfortably at proper angle
9.) Kickbacks	Triceps	Extend the arm	Assists in holding arm comfortably at proper angle
10.) Abdominal	Rectus Abdominus, transversals (abdomen)	Flex spine, stabilize posture	Assists in breathing by stabilizing rib cage

CHAPTER TWELVE: NON–NAUTILUS MAX CONTRACTION WORKOUT

As not everyone will have access to the same machines (Nautilus, first generation) that Tim Peake and the other trainees on the Nautilus North Study utilized, I am presenting a Max Contraction workout using conventional equipment that can also be employed with excellent results. The key is to train but once every 7 days and to take each set to the point where you can no longer sustain the maximum contraction.

MAX CONTRACTION WORKOUT

1) Quads: Leg extensions
2) Hams: Leg curls
3) Calves: Donkey Calf raise
4) Lats: Pulldowns (using MAX straps)
5) Traps: Shrugs
6) Delts: Lateral raises
7) Pecs: Pec Deck
8) Triceps: Dumbbell kickbacks
9) Biceps: Flexed arm hang
10) Forearms: wrist curls
11) Abs: crunches

The correct performance of all of these exercises using non-Nautilus equipment substitutes are fully described in my book and in the Max Contraction Training manual, of which this e-book is meant as an adjunct -- however, for purposes of illustration, let us examine the performance of one exercise – Lat Machine Pulldowns (incorporating MAX straps).

This exercise – which can also be performed on a Nautilus Pullover machine if you don't have access to MAX straps -- emphasizes several muscle groups, the Latissiums dorsi, the rear deltoid, trapezius, pectorals and abdominals among them. To begin this exercise, position yourself in a lat pulldown machine and insert your arms through the "Lat Blaster" straps so that the bottom padded part of the strap is over the end of your upper arm (nearest the elbow joint) and your hands are resting against the side straps.

Don't close your hands on the straps, as this will unnecessarily involve and fatigue the forearm muscles and (to a lesser extent) the biceps. Using only the strength of your latissimus dorsi muscles, draw your elbows down and back until they are just to the sides of your lower ribs. Hold for 30 to 60-seconds. Once the weights start piling up, you will need assistance to bring your elbows down into the fully contracted position, as your holding strength is always stronger than your positive or concentric strength.

These exercises place a constant stress/tension on the target muscle groups from beginning to end and are, therefore, the most productive exercises possible owing to their extremely high intensity threshold.

Remember there are no repetitions involved in this program, you are to think only in terms of seconds, in a normal set of 10 repetitions, the time frame is typically between 45 and 60 seconds in length but the intensity level varies throughout the range of motion. In M.C.S, one 'set' also takes between 45 and 60 seconds to perform but the intensity is the highest possible throughout the entire duration of the set, thus allowing for greater growth stimulation to actually take place.

When commencing any exercise M.C.S. style, lift the resistance slowly (so as not to damage any ligaments or muscle tissue) up to the position of full muscular contraction, as if you would if you were performing a regular set. But instead of then lowering the weight, hold this fully contracted position for a minimum of 45 seconds (shoot for 60 seconds) or until the contraction can no longer be held (which ever comes first).

If you can hold the resistance for more than 45 seconds, then it's too light and you should heavy it up by 5% by the next workout. If you can't hold the contraction for a full 45 seconds, then it's too heavy and you should reduce the resistance by 5% unfit you can contract the muscle for a full 45 seconds.

Some of you may require a spotter (or two) to lift the weight up into the fully contracted position for you. In which case, make sure they don't just 'drop' the weight into your muscle group as the sudden shock to the joint of articulation could prove traumatic.

Every movement must be done slowly, particularly the settling into the fully contracted position. You may notice that your target muscle group might begin to shake violently at about the 30-40 second mark, but that's fine. It's an indicator that your muscles are firing up more and more fibers to maintain the contraction, and the more they use, the greater the growth stimulation!

After a M.C.S. workout, you will feel like your limbs are made of Jell-O owing to the high volume of activated muscle fibers. Based on the results of the Nautilus North Study, if you wish to reap maximum growth gains from this system, you must now rest completely (i.e., no other forms of strenuous exercise) until your next workout some 7 days later. Eat a proper diet, get adequate rest and train as hard as you possibly can on this program and you should realize the best gains of your bodybuilding career!

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NEGATIVE EFFECTS OF STEROIDS: